UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,593	03/19/2002	Hirofumi Ishii	5077-000077	6856

			EXAMINER
27572	7590	03/14/2005	MISTRY, O NEAL RAJAN

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DATE MAILED: 03/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>19 March 2002</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1 and 3-9</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1 and 3-9</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>19 March 2002</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   This application has been examined.

2.   Claims 1,3-9 are presented for examination.

Drawings

3.   The Examiner contends that the drawings submitted on 03/19/2002 are

acceptable for the examination proceedings.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4.   Claims 1, 3-5,are rejected under 35 U.S.C. 102(e) as being anticipated by

Shimonura (U.S. Patent Number 6,477,260).

5.   In regards to claim 1, Shimonura discloses a plurality of imaging means installed

on said moving body for taking camera image of the rear of said moving body (Figure

1A, col. 5 lines 1-6, Note the camera are connected to vehichle) [It is noted that

the pair of the cameras 1 and 2 may be disposed on a rear part

of the vehicle so as to direct their viewing portions toward a

rearward direction to enable a detection of obstacle located

behind of the vehicle.]; and

detection means for detecting movement of an object present in the rear of said

moving body on said camera images of said plurality of imaging means (Figure 1A item

6, Note the system is calculating the parallax of both images, and then item 8 is

calculating the distance, so the examiner in concludes the system contains a diction

means for detecting movement relative to distance),

wherein said plurality of imaging means have, in camera images thereof, an

overlap area that includes an area in the vicinity of a vanishing point and in which

imaging areas of first imaging means and second imaging means overlap with each

other (Figure 4D, note the examiner interprets that Figure 4D is a combination of Figure

4A & Figure 4B and are used to calculate the distance. In conclusion, the examiner

interprets that Figure 4D is a overlap of the two images. Also, the examiner inteprets

that overlapping images in stereo parallax is inherent because the system has to use

both image to compare the distance the two images for calculating the actual distance,

as stated on col. 5 line 60- col. 6 line 3), and

said detection means obtain a stereo parallax between said first imaging means

and said second imaging means in said overlap area, and obtains a distance to said

object on the basis of said obtained stereo parallax (col. 5 line 45-50, col. 6 line 62-68)

[FIGS. 2A and 2B are explanatory views for explaining a basic

theory of a determination of a distance from the pair of the

cameras 1 and 2 to an object to be detected according to a

triangulation using a stereophotographic image processing.] &

[FIGS. 4A through 4D show the process of these determinations of

the mutually corresponding positions between the two images and

the result of the determinations (calculations) of the parallax

S for each window from their corresponding positions between the

two images.].

wherein said detection means detects flows corresponding to movement with

time of an image in the imaging area of said first imaging means excluding said overlap

area, and (col. 15 line 67- col. 16 line 5) [the distance measuring apparatus

stores the average value for every number of times determined

for each x-axis coordinate position of the windows and

calculates a variance of the average value in the luminance for

each x-axis coordinate position within the predetermined period

of time. Then, the distance measuring apparatus determines]

detects movement of said object present in the rear of said moving body on the basis of

said detected flows (col. 16 line 4-16, Note that with time the system measure the

distance and position of the vehicles. In addition, the examiner interprets the prior art is

describing the system with the camera in front of the vehicle, which can easily be

applied to rear of the car.) [relatively small value is determined to be

an inner part of the vehicle, i.e., a vehicle body so that the

lateral (left and right) ends of the vehicle can be determined.

As described above, when determining the lateral end positions

of the vehicle (preceding vehicle) within the range B, the

distance measuring apparatus calculates the average value of the

luminance for each x-axis coordinate position within the

vertical range B continuously in time and determines that the x-

axis coordinate positions at each of which the time variance of

the average value in luminance calculated for each x-axis

coordinate].

6.   In regards to claim 3, Shimonura discloses image synthesizing means for

generating an image representing (Figure 1A items 3 & 4, Note the images are stored in

memory, and then computed for further analysis for determining distance) the rear of

said moving body through image synthesis using said camera images (Figure 1A, items

1 & 2, Note that both items are cameras for capture picture in front or rear of the

vehicle) of said plurality of imaging means (Figure 1A, note the figure describes the

entire process from capture image using the camera, and calculating the distance and

more further analysis).

7.   In regards to claim 4, Shimonura discloses Danger level determining means for

determining a possibility of collision (col. 24 line 4-8) [FIG. 21A shows a

situation in which the device determines whether the vehicle can

safely be forwarded without collision in a case where other

vehicles are running or standing randomly in front of a toll-

gate (the traffic congestion occurs in front of the toll-gate).]

of said moving body with an approaching object from the rear of said moving body (col.

5 line 2-6) [pair of the cameras 1 and 2 may be disposed on a rear

part of the vehicle so as to direct their viewing portions

toward a rearward direction to enable a detection of obstacle located behind of the vehicle.] on the basis of information output from said detection means and for outputting an indicator signal when it is determined that there is a strong possibility of collision (col. 24 lines 9-14) [Since the distance measuring apparatus according to the present invention can accurately detect the lateral end positions of the obstacle (the preceding vehicle) or the obstacles, the device can determine whether the vehicle can safely be forwarded by comparing the width aside the obstacle(s) with the lateral width of the vehicle on which the distance measuring apparatus]; and

external warning means for providing a warning to the rear of said moving body when said indicator signals is output from said danger level determining means (col. 24 lines 14-17, Note the examiner interprets the collision prevention system displays warning and on the LCD.) [The result of the determination by the device is displayed on a screen of the liquid crystal display mounted in the vehicle so as to produce the determination result to the vehicular driver.].

8.   In regards to claim 5, Shimonura discloses Danger level determining means for determining a possibility of collision (col. 24 line 4-8) [FIG. 21A shows a situation in which the device determines whether the vehicle can safely be forwarded without collision in a case where other vehicles are running or standing randomly in front of a toll-

gate (the traffic congestion occurs in front of the toll-gate).] of said moving body with an approaching object from the rear of said moving body (col. 5 line 2-6) [pair of the cameras 1 and 2 may be disposed on a rear part of the vehicle so as to direct their viewing portions toward a rearward direction to enable a detection of obstacle located behind of the vehicle.] on the basis of information output from said detection means and for outputting an indicator signal when it is determined that there is a strong possibility of collision (col. 24 lines 9-14) [Since the distance measuring apparatus according to the present invention can accurately detect the lateral end positions of the obstacle (the preceding vehicle) or the obstacles, the device can determine whether the vehicle can safely be forwarded by comparing the width aside the obstacle(s) with the lateral width of the vehicle on which the distance measuring apparatus]; and

passenger protecting means for taking measure to protect a passenger of said moving body when said indicator signal is output form said danger level determining means (col. 24 lines 24-26, Note the examiner interprets that the vehicular brake system is a passenger protecting means.) [Furthermore, the device can be used to automatically operate the vehicular brake system to control the deceleration and brake of the vehicle.].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set
forth in section 102 of this title, if the differences between the subject matter sought to be patented and
the prior art are such that the subject matter as a whole would have been obvious at the time the
invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating
      obviousness or nonobviousness.

9.   Claims 6, 7, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Shimonura (U.S. Patent Number 6,477,260) in view of Hara et al (U.S. Patent Number

6,728,417)

10.   In regards to claim 6, Shimonura teaches a system that uses to two different

camera for stereophotographic imaging for calculating the distances of moving vehicles.

In addition, Shimonura discloses imaging means installed on said moving body for

taking a camera image of a surrounding region of said moving body (Figure 1A, col. 5

lines 1-6) [It is noted that the pair of the cameras 1 and 2 may be

disposed on a rear part of the vehicle so as to direct their

viewing portions toward a rearward direction to enable a

detection of obstacle located behind of the vehicle.], image

generating means for converting said camera image of said imaging means into an

image seen from a visual point positioned differently from said imaging means (col. 5

line 24-29) [The pair of the image memories 3 and 4 receive image

signals from the pair of the cameras 1 and 2. In FIG. 1A, a

window setting section 5 is connected to one of the pair of the

image memories 3 and 4. A window corresponds to an image split

region as will be described later.]; and detecting means for detecting a

distance from said moving body to an object imaged in said camera image (col. 5 lines

45-50) [FIGS. 2A and 2B are explanatory views for explaining a

basic theory of a determination of a distance from the pair of

the cameras 1 and 2 to an object to be detected according to a

triangulation using a stereophotographic image processing.],

The difference between the claims and Shimonura is the claims recite "Wherein

said image generating means corrects distortion of an image of said object by using

said distance detected by said detection means in converting said image".

Hara teaches a system that measure distance using a camera similar to that of

Shimonura. In addition, Hara further teaches wherein said image generating means

corrects distortion of an image of said object by using said distance detected by said

detection means in converting said image (col. 7 line 67- col. 8 line 6). [As explained

above, Tsai's perspective transformation model considering a

lens distortion is employed as a camera model for calibration.

However, the present invention is not limited to the model, and

any calibration method which can correct at least a lens

distortion and a <u>distortion caused by perspective</u> transformation can be employed. For example, calibration may be performed without setting a specific camera model.]

It would have been obvious to one of ordinary skill in the art, having the teachings of Shimonura and Hara before him at the time the invention was made, to modify the image distortion taught by Shimonura to include the method to correct the distortion of Hara, in order to obtain a system that corrects distortion for the purpose of accurately measure the distance of an object.

One would have been motivated to make such a combination because it would solve the problem for when pixel positions of a distorted image on a screen are transformed into positions in a space, errors are contained, and therefore, the precision of measurement outputs and determination outputs are degraded, would have been obtained, as taught by Hara. In addition, the combined system would allow more accurate measurements of vehicles located in front or behind the car, and would allow a safer prevention collision system for the driver, as taught by Shimonura.

11.   In regards to claim 7, Shimonura in view of Hara discloses wherein said imaging means is plural in number (Figure 1A, item 1 & 2, Note the examiner interprets that the system capture two different images),

said plural imaging means have, in camera images thereof, an overlap area in which imaging areas of first imaging means and second imaging means overlap with each other (Figure 4D, note the examiner interprets that Figure 4D is a combination of

Figure 4A & Figure 4B and are used to calculate the distance. In conclusion, the

examiner interprets that Figure 4D is a overlap of the two images), and

said detection means obtains a stereo parallax between said first imaging means

and said second imaging means in said overlap area, and obtains a distance to said

object on the basis of said obtained stereo parallax (col. 6 lines 5-11) [In the

equation (1), Xa-Xb=S denotes a parallax. As shown in FIGS. 2A

and 2B, when a single object is photographed by means of two

cameras CAMERA A and CAMERA B disposed at a predetermined

interval of distance with the optical axes being parallel to

each other, the parallax is difference in position of the images

photographed by the respective cameras, namely, the difference

in position between a position Xa at the image A and a position

Xb at the image B.]

12.   In regards to claim 8, Shimonura in view of Hara discloses wherein said diction

means obtains a distance to said object on the basis of flows corresponding to

movement with time of said camera image (col. 15 line 66- col. 16 line 8)

13.   Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Shimonura (U.S. Patent Number 6,477,260) in view of Hannah (U.S. Patent Number

5,886,744).

14.   In regards to claim 9, Shimonura teaches a system that uses to two different

camera for stereophotographic imaging for calculating the distances of moving vehicles.

In addition, Shimonura discloses imaging means installed on said moving body for

taking a camera image of a surrounding region of said moving body (col. 5 line 1-6); and

detection means for obtaining flows corresponding to movement with time on the

basis (col. 15 line 67- col. 16 line 5) [the distance measuring apparatus

stores the average value for every number of times determined

for each x-axis coordinate position of the windows and

calculates a variance of the average value in the luminance for

each x-axis coordinate position within the predetermined period

of time.] of said camera image of said imaging means and for detecting movement of

an object present in the surrounding region of said moving body on the basis of said

flows (col. 2 line 1-5, Note the examiner interprets that camera image means detects

movement around the vehicle.) [a search for vertical (longitudinal)

edges above the road surface is advanced. The

stereophotographic matching is carried out using the vertical

edge to detect the distance to the preceding vehicle and to

detect the position of the preceding vehicle on the image.].

The difference between the claims and Shimonura is the claims recite "wherein

said detection means obtains, as preparation for detecting the movement of said object,

and offset estimates value from each of said obtained flows and cancels said offset

estimated value from each of said flows as a vibration components derived from jolt of

said moving body".

Hannah teaches a method to record video data from cameras and filtering the unnecessary movement of the camera similar to that of Shimonura. In addition, Hannah further teaches wherein said detection means obtains, as preparation for detecting the movement of said object, and offset estimates value from each of said obtained flows and cancels said offset estimated value from each of said flows as a vibration components derived from jolt of said moving body (col. 4 lines 1 -5) [Edge detector/analyzer 31 analyzes any edge motion detected and determines whether the motion is legitimate "real" motion, or jitter, in which case edge detector/analyzer 31 <u>instructs jitter filter 37 to discard, or preferably filter, the motion vectors associated with frames corrupted by jitter</u>.].

It would have been obvious to one of ordinary skill in the art, having the teachings of Shimonura and Hannah before him at the time the invention was made, to modify the camera vibration taught by Shimonura to include the a filters to process camera jitters of Hannah, in order to obtain a system that captures images and filters unnecessary camera movement which will decrease the accuracy of the distanced measured.

One would have been motivated to make such a combination because the system solves the problem of noise which is considered as jittering, jitter is typically random, oscillatory movement of an entire frame in either or both of the x and y planes or about the z axis (rotation). Jitter can cause a static object in an image to appear as if

it has moved, when in fact it has not, and can distort actual image movement would have been obtained, as taught by Hannah.
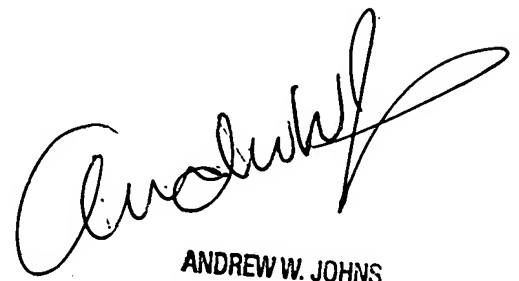
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to O'Neal R Mistry whose telephone number is (703) 305-4675. The examiner can normally be reached on 9am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh M Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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